



The University of Iowa Libraries



IOWA GEOLOGICAL SURVEY

VOLUME XXXII

Annual Reports, 1925 and 1926

with

Accompanying Papers

GEORGE F. KAY, Ph.D., State Geologist
JAMES H. LEES, Ph.D., Assistant State Geologist

Published by
THE STATE OF IOWA
Des Moines
1927

Geology
v. 32
1925-26

Geological Survey Organization

GEOLOGICAL BOARD

HIS EXCELLENCY, JOHN HAMMILL.....	GOVERNOR OF IOWA
HON. J. C. McCLUNE.....	AUDITOR OF STATE
DR. WALTER A. JESSUP.....	PRESIDENT STATE UNIVERSITY
DR. RAYMOND A. PEARSON.....	PRESIDENT STATE COLLEGE
MR. R. I. CRATTY.....	PRESIDENT IOWA ACADEMY OF SCIENCE

ADMINISTRATIVE OFFICERS

GEORGE F. KAY.....	STATE GEOLOGIST
JAMES H. LEES.....	ASSISTANT STATE GEOLOGIST
NELLIE E. NEWMAN.....	SECRETARY

GEOLOGICAL SECTION

GEORGE F. KAY.....	PLEISTOCENE GEOLOGY
JAMES H. LEES.....	AREAL GEOLOGY
WILLIAM H. NORTON.....	UNDERGROUND WATERS
B. SHIMEK.....	AREAL GEOLOGY
A. O. THOMAS.....	STRATIGRAPHIC GEOLOGY AND PALEONTOLOGY
JOHN E. SMITH.....	ECONOMIC GEOLOGY
A. C. NOE.....	STRATIGRAPHIC GEOLOGY, DES MOINES SERIES
HARRY S. LADD.....	STRATIGRAPHIC GEOLOGY, MAQUOKETA FORMATION
EARL T. APFEL.....	PLEISTOCENE GEOLOGY
G. MARSHALL KAY.....	STRATIGRAPHIC GEOLOGY, DECORAH FORMATION
A. C. TESTER.....	STRATIGRAPHIC GEOLOGY, CRETACEOUS SYSTEM

TOPOGRAPHIC SECTION

E. L. McNAIR.....	ASSOC. GEODETIC ENGINEER
HERBERT W. ELMORE.....	ASSOC. CARTOGRAPHIC ENGINEER
FRANK L. WHALEY.....	ASSOC. TOPOGRAPHIC ENGINEER
H. E. SIMMONS.....	ASST. TOPOGRAPHIC ENGINEER
H. R. KILMER.....	TOPOGRAPHER
ARTHUR JOHNSON.....	JUNIOR TOPOGRAPHIC ENGINEER
W. R. BROADDUS.....	APP. ENG. FIELD ASSISTANT
J. D. WHITRIGHT.....	RODMAN
EARLE FENNELL.....	RODMAN
EARL HAMMACK.....	RODMAN

WATER GAGING SECTION

J. B. SPIEGEL.....	DISTRICT ENGINEER
KARL JETTER.....	ASSISTANT ENGINEER
S. C. FULLER, KALO.....	GAGE READER
B. S. BEEHRLE, MARSHALLTOWN.....	GAGE READER
JOHN STRODTHOFF, MAQUOKETA.....	GAGE READER
MRS. H. H. SHERBURNE, CLARKSVILLE.....	GAGE READER

E. J. PROLOW, GARBER.....	GAGE READER
JOHN A. DALE, AMES.....	GAGE READER
MRS. EMMA CAMERON, JANESVILLE.....	GAGE READER
C. L. EHRHART, BOONE.....	GAGE READER
CALVIN K. SMITH, VAN METER.....	GAGE READER
D. M. COLEMAN, TRACY.....	GAGE READER
FLOYD A. NAGLER, IOWA CITY.....	GAGE READER
R. I. COON, AMES.....	GAGE READER
C. W. WARREN, WAPELLO.....	GAGE READER
J. A. SCHROEDER, AUGUSTA.....	GAGE READER
J. W. RICKS, COPPOCK.....	GAGE READER
FRANK SCHRECKENGAST, KEOSAUQUA.....	GAGE READER
MRS. J. B. WILLIAMS, KEOKUK.....	GAGE READER

CONTENTS

	PAGE
THE ANNUAL REPORTS OF THE DIRECTOR, 1925 AND 1926, GEORGE F. KAY.....	7
MINERAL PRODUCTION IN IOWA IN 1925, JAMES H. LEES.....	9
MINERAL PRODUCTION IN IOWA IN 1926, JAMES H. LEES.....	35
ROCK RESOURCES OF IOWA, GEORGE F. KAY.....	51
IOWA COAL AREAS AND CHARACTERISTICS OF IOWA COAL, JAMES H. LEES.....	65
THE USE OF IOWA COAL FOR STEAM PRODUCTION, T. A. MARSH.....	82
POSSIBLE RESEARCHES IN IOWA COAL, B. P. FLEMING.....	91
GEOLOGY OF LUCAS COUNTY, ALVIN L. LUGN.....	101
GEOLOGY OF CRAWFORD COUNTY, JAMES H. LEES.....	239
ALTITUDES IN IOWA, JAMES H. LEES.....	363

LIST OF ILLUSTRATIONS

PLATE	PAGE
I. Generalized sections of coal prospect holes.....	136
II. General columnar section of Lucas county strata.....	142

FIGURE	PAGE
1. General geological section for Iowa.....	52
2. Geological map of Iowa.....	53
3. Iowa mineral production, 1920 to 1925.....	55
4. Relative values of Iowa minerals, 1925.....	56
5. Values of coal produced, 1920 to 1925.....	57
6. Tons and values of coal produced, 1920 to 1925.....	57
7. Map showing counties producing coal.....	58
8. Values of cement produced, 1920 to 1925.....	59
9. Values of gypsum produced, 1920 to 1925.....	60
10. Chart showing values of clay products, 1920 to 1925.....	61
11. Sand and gravel production, 1920 to 1925.....	62
12. Stone and lime produced, 1920 to 1925.....	63
13. Map showing chances for oil in Iowa.....	64
1. Location of Lucas county in Iowa.....	106
2. Profile through the Norwood upland.....	109
3. The Norwood upland.....	110
4. Profile across Pleasant township.....	111
5. Drainage map of Lucas county.....	114
6. Gradient profile of Chariton river.....	115
7. Cross section profile of Chariton river valley.....	115
8. Gradient profile of White Breast creek.....	116
9. Gradient profile of Barker creek.....	117
10. Cross section profile of White Breast creek.....	117
11. Coal Measures and fluvioglacial deposits exposed on White Breast creek.....	118
12. Cross section profile of Little White Breast creek.....	119
13. White Breast creek in flood.....	122
14. White Breast creek in time of low water.....	123
15. An exposure of Cherokee beds in Pleasant township.....	144
16. Strata of part of exposure north of Wheeler's bridge.....	160
17. Typical Coal Measures exposure in Swede Hollow.....	161
18. Sandstone in Swede Hollow.....	162
19. Contact of Cherokee and Henrietta formations in section 5, White Breast township.....	163
20. Disintegrating granite boulder in transition zone between till and gum-bottil.....	170

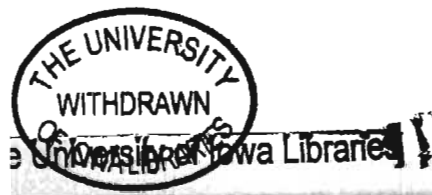


FIGURE	PAGE
21. Large Kansan boulder northwest of Norwood.....	172
22. Prospecting drill rig	184
23. Map of underground workings of Mine No. 4.....	188
24. Map of underground workings of Mine No. 3.....	189
25. Loading tracks at Mine No. 4.....	191
26. General view top works Central Iowa Fuel Company Mine No. 4.....	191
27. Tipple of Mine No. 4.....	192
28. Rock dump at Mine No. 4.....	193
29. Central Iowa Fuel Company No. 2.....	194
30. Rock dump at Mine No. 2.....	195
31. Central Iowa Fuel Company Mine No. 3.....	196
32. Daniel's mine at Lucas.....	197
33. Drift mine in Swede Hollow.....	197
34. Boyer valley at Denison.....	256
35. Saucer-like depressions at headwaters of Boyer tributaries.....	258
36. Uplands of southern Jackson township.....	259
37. Upland south of Schleswig.....	261
38. Level upland in Hayes township.....	264
39. Bench in Boyer valley above Dow City.....	268
40. Outline map of Crawford county.....	269
41. Profile from Breda to Mapleton.....	271
42. Map of Sac county.....	273
43. The wide sag and the narrower valley of Boyer river in Sac county.....	274
44. Profiles across Boyer valley.....	274
45. East Boyer valley at Denison.....	284
46. Steep headwater slopes of Buck creek tributaries.....	286
47. East Soldier valley in Hanover township.....	291
48. The Nebraskan gumbotil between Sac and Crawford counties.....	305
49. Section in ravine above Boyer.....	306
50. Railroad cut one and one-half miles west of Manning.....	310
51. Railroad cut one mile east of Aspinwall.....	313
52. Diagram of cut two miles northeast of Manilla.....	314
53. Diagram of cut two miles south of Deloit.....	319
54. Diagram of cut one-half mile west of Aspinwall.....	324
55. Divide cut between Aspinwall and Manilla.....	325
56. Mill sand pit at Denison.....	329
57. Riddell gravel pit below Arion.....	330
58. Contorted bands of sand and loess, Butler pit.....	335
59. Gully in loess in Boyer valley near Dow City.....	336
60. Yellow loess over gray, Willow township.....	340
61. Diagram of wall of Green clay pit, Denison.....	341
62. View of pit of Green clay works.....	342

MAPS

	PAGE
Map showing geological formations of Lucas county, to face.....	238
Map showing glacial formations of Crawford county, to face.....	362
Topographic map of Iowa, to face.....	550